

Remarks/Arguments

Claims 25 and 39 have been amended.

The Examiner has rejected applicants' claims 39 and 47 under 35 USC 101 because the claimed invention is directed to non-statutory subject matter. The Examiner has argued that claim 39 recites "providing a storage means," "acquiring layout information," "generating authentication information," and "collating the authentication information," while remaining silent with respect to who or what performs these steps. Applicants respectfully disagree with the Examiner's arguments and believe that claim 39 is tied to an apparatus, namely a storage means that stores registration information including layout information representing positions of reacted spots on a reacted DNA array. Applicants also believe that the method of claim 39 transforms the underlying subject matter to a different state or thing, namely transforming reacted spots on a reacted DNA array attached on an authentication certificate into authentication information on the basis of the layout of the reacted spots, which is then collated with registration information in the storage means so as to make the authentication. That is, in applicants' independent claim, the physical layout of the reacted spots on a DNA array is transformed into authentication data, wherein authentication data represents the physical properties of the user's DNA. Applicants, therefore, believe that applicants' independent claim 39, and its dependent claim 47, is directed to patentable subject matter in compliance with 35 USC 101.

The Examiner has rejected applicants' claims 25, 33, 39 and 47 under 35 USC 112, first paragraph, as failing to comply with the written description requirement. In particular, the Examiner has argued that claims 25 and 39 contain subject matter not described in the specification because the specification does not appear to disclose wherein the hybridization

pattern is a two dimensional binary pattern indicated by the presence or absence of the reaction at the spots. Applicant has amended applicant's independent claims 25 and 39 to delete the recitation "the hybridization pattern is a two-dimensional binary pattern indicated by the presence or absence of the reaction at the spots," thereby obviating the Examiner's rejection. In addition, the features of applicants' independent claims 25 and 39, which have been added by the present amendment, are disclosed in paragraphs [0065] and [0068] of this application published as U.S. Publication No. 2002/01049682. Therefore, applicants believe that applicants' amended independent claims 25 and 39, and their respective dependent claims, are in compliance with 35 USC 112, first paragraph.

The Examiner has also rejected applicants' claims 25 and 33 under 35 USC 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner has argued that claim 25 recites "controlling means for executing a processing comprising the steps of: (i) generating authentication information on the basis of the layout information acquired by the acquisition means; and (ii) collating the authentication information with the registration information as a reference stored in said storage means, and making authentication" and that it is unclear from this recitation whether the generating and authenticating are steps of the process being executed or steps in the controlling the process. The Examiner has also argued that claim 25 recites both an apparatus and a method. Applicants respectfully disagree with the Examiner and believe that the language of claim 25 clearly recites the functions performed by the controlling means, which, according to claim 25, executes a process that has the steps of generating authentication information and collating the authentication information and making authentication. Applicants therefore

believe that claims 25 and 33 clearly recite and particularly point out the subject matter which applicants regard as the invention, in compliance with 35 USC 112, second paragraph.

The Examiner has rejected applicants' claims 25, 33, 39 and 47 under 35 USC 103(a) as being unpatentable over the Black patent (U.S. Pat. No. 6,307,956) in view of the Yguerabide, et al. patent (U.S. Pat. No. 6,586,193) and further in view of the Lockhart, et al. patent (U.S. Pat. No. 6,344,316). Applicants have amended applicants' independent claims 25 and 39 and with respect to these claims, as amended, and their respective dependent claims, the Examiner's rejections are respectfully traversed.

Applicants' independent claim 25 has been amended to recite an authentication system for personal authentication which is used together with an authentication certificate on which a DNA array reacted with a gene obtained from a given person is attached, the DNA array carrying a plurality of spots of DNA probes corresponding to plural kinds of genes in a predetermined order, the system comprising: storage means for storing registration information which includes layout information representing positions of reacted spots on a reacted DNA array, acquisition means for detecting positions of reacted spots on a reacted DNA array attached on an authentication certificate and acquiring layout information indicative of the detected positions of reacted spots, and controlling means for executing a process comprising the steps of: (i) generating authentication information on the basis of the layout information acquired by the acquisition means, and (ii) collating the authentication information with the registration information as a reference stored in the storage means, and making authentication, wherein a plurality of spots of different DNA probes are arranged on the DNA array so that the DNA array presents a different combination of reacted spots depending on a different personal DNA, each of the spots indicates presence or absence of a

target gene arrangement by presence or absence of reaction. Applicants' independent claim 39 has been similarly amended.

The constructions recited in applicants' amended independent claims 25 and 39 are not taught or suggested by the cited art of record. In particular, the cited Black, Yguerabide and Lockhart reference fail to teach or suggest detecting positions of reacted spots on a reacted DNA array, acquiring layout information indicative of the detected positions of reacted spots, generating authentication information using the acquired layout information and collating the authentication information with the registration information as a reference stored in the storage means and making authentication.

Specifically, the Black patent teaches an identity verification system that uses biometric properties, such as DNA, for identity verification, in which DNA biometric properties are matched using cell capture/analysis sensors, and in which mass spectroscopy-based chemical analysis of single-stranded DNA oligomers or arrays of immobilized single-stranded DNA (ssDNA) probes can be used. See, Col. 4, lines 37-41; Col. 7, lines 65-67; Col. 25, lines 13-44. Black teaches that biometric properties can be captured for reference purposes during registration and that a user may be required to carry a device that includes an encrypted reference biometric for reference purposes to gain access into the system. See, Col. 4, lines 54-66. However, Black is silent as to determining and storing layout information representing positions of reacted spots on reacted DNA array. Rather, Col. 4, lines 20-30 of Black cited by the Examiner, only discloses use of a stylus with any of a number of biometric properties while the user writes something, and Col. 4 further only teaches that biometric properties can be captured and stored on a device for future reference and access. See, Col. 4, lines 37-66. However, there is no mention in these portions of Black, or anywhere else in

Black, of the type of information stored or registered in cases where DNA is the biometric property, and thus, Black makes no mention of storing and using for identification verification DNA layout information, let alone of using layout information that represents positions of reacted spots on a reacted DNA array. Accordingly, there is no, and cannot be any, teaching in Black of detecting positions of reacted spots on a reacted DNA array attached on an authentication certificate and acquiring layout information indicative of the detected positions of reacted spots, of using the acquired layout information to generate authentication information which is collated with registration information stored in the storage means to make authentication.

These features are also not taught or suggested in Yguerabide, et al. or Lockhart, et al. Specifically, Yguerabide, et al. discloses a "DLASLPD" (direct light angled for scattered light only from particle detected) method for detecting DNA probes or analytes reacted with a DNA array, wherein each of the probes corresponds to a plurality of genes arranged in a predetermined order and has a detectable light scattering particle bound to it. See, Col. 11, lines 30-50; Col. 9, lines 57-66; Col. 86, lines 36-52; Col 100, lines 8-31. Thus, Yguerabide, et al. teaches a DNA probe detection method in which one or more DNA arrays, i.e. DNA probes, each carrying one or more particles bound thereto, is reacted with a gene from a person, and in which DLASLPD technique is employed to determine the presence or absence of the DNA arrays and the concentration of the DNA arrays in a sample. See, Col. 100, lines 19-31; Col. 86, lines 34-52; Col. 83, lines 53-67; Col. 11, lines 11-44. This method of Yguerabide, et al. allows for identification and measurement of specific nucleic sequences of RNA, DNA and other nucleic acid sequences. See, Col. 99, lines 49-63. However, Yguerabide, et al. makes no mention of detecting or storing layout information that represents

the positions of the reacted spots on the reacted DNA array. Instead, Yguerabide, et al. only teaches detecting the presence and concentration of particles bound to the DNA array reacted with the gene. Moreover, there is no mention in Yguerabide, et al. of using the layout information of the positions of reacted spots on the reacted DNA array for making of authentication of a person, let alone of using the layout information for storage as registration information and for generating authentication information which can be collated with the registration information to make an authentication, as recited in applicant's independent claims 25 and 39.

The Lockhart, et al. patent teaches hybridizing target nucleic acid samples to an array of probes, detecting the pattern of hybridization and the differences between the hybridization patterns. See, Abstract; Col. 13, lines 40-67; Col. 16, lines 56-64; Col. 20, lines 57-67; and Col. 21, lines 8-18. Lockhart, et al. also teaches labeling of hybridized nucleic acids by adding labels to the nucleic acid samples so that the hybridized nucleic acids can be detected by detecting one or more labels attached thereto. See, Col. 24, lines 8-63. Lockhart, et al. further discloses a DNA sequencing process in which a reference DNA sample is hybridized/ligated to a generic DNA array, a set of electronic tilings is generated and corresponding basecalls are made so as to a correctness score. See, FIGS. 26, 27; Col. 107, lines 1-20. However, Lockhart, et al. makes no mention of performing an authentication procedure using layout information representing positions of reacted spots on a reacted DNA array included in an authentication certificate. Instead, Lockhart, et al. merely discloses hybridizing DNA samples to DNA probes and using the hybridized samples for detecting the DNA probes and sequencing the DNA samples.

Moreover, the combination of the Black, et al., Yguerabide, et al. and Lockhart, et al. references does not teach or suggest using layout information of an authentication certificate, representing detected positions of reacted spots on a reacted DNA array, for authentication. Instead, Black, et al. merely teaches use of biometric properties such as DNA for authentication and that the biometric properties can be captured and stored on a device for future reference and access, but fails to teach any detection or use of layout information that represents positions of reacted spots on a reacted DNA array in the authentication process. The Yguerabide, et al. and Lockhart, et al. patents only teach detecting DNA probes attached to a DNA sample and DNA sequencing techniques, but do not mention use of layout information of positions of reacted spots on a reacted DNA array for authentication of a user. Accordingly, the combined teachings of Black, et al., Yguerabide, et al. and Lockhart, et al. do not, and cannot, teach use of layout information that represents positions of reacted spots on a reacted DNA array of an authentication certificate for storing registration information and for generating authentication information which is collated with the registration information to make an authentication of a person.

Applicant's amended independent claims 25 and 39, each of which recites an authentication certificate on which a DNA array reacted with a gene obtained from a given person is attached, the DNA array carrying a plurality of spots of DNA probes corresponding to plural kinds of genes in a predetermined order, storing registration information which includes layout information representing positions of reacted spots on a reacted DNA array, detecting positions of reacted spots on a reacted DNA array attached on an authentication certificate and acquiring layout information indicative of the detected positions of reacted spots, generating authentication information on the basis of the acquired layout information

and collating the authentication information with the registration information as a reference stored in the storage means and making authentication, and their respective dependent claims, thus, patentably distinguish over the cited Black, et al., Yguerabide, et al. and Lockhart, et al. reference, taken alone or in combination with one another.

In view of the above, it is submitted that applicants' claims, as amended, patentably distinguish over the cited art of record. Accordingly, reconsideration of the claims is respectfully requested.

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